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EXAMINER

CORRIELUS, JEAN B

ART UNIT PAPER NUMBER

2637

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/024,120

Applicant(s)

KLIMOVITCH, GLEB V.

Examiner

Jean B. Corrielus

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 and 34-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 and 34-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the step of comparing, as recited in claim 1, claim 8, claim 15; the steps recited in claim 13; the limitations recited in claim 20; the DSP hardware or software, the oscillators as recited in claim 34, the transmitters and receivers, recited in claim 34, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: there no proper antecedent basis for the claim steps recited in claim 13 and claim 15, lines 10-12.

Claim Objections

3. Claim 7 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form as every limitations of claim 7 are recited in base claim 1.

4. Claims 1-14, 19-21, 34, 35 and 37 are objected to because of the following informalities:

Claim 1, lines 7-9, what does it mean by “**during one block** all transmitted training sequence signals”? In addition, the claim language suggests that each block includes more than one “training sequence signals” while the specification, see for instance page 17, line 27, teaches that each block include a training sequence. In addition, the specification at page 19, lines 10-15, recites that the phase of the training sequence is inverted while it isn’t in the first? The same comment applies to “during another block all

transmitted training sequence signals". The same comment applies to claim 8 and claim 35.

Claim 10, line 1, what does it mean by "said block number Nblock"? and "said transmitting antennas number Ntx"? line 3 what does it mean by "->" the same comment applies to line 4; line 3, "Nblock" has to be different than 0 and 1 for the sequence to be true; line 5, "Ntx" has to be different than 0 and 1 for the sequence to be true.

Claim 11, line 1, "plurality of" should be inserted after said. In addition, the claim recites "their preserved orthogonality". Orthogonality of what are preserved? The same comment applies to claim 37.

Claim 19, what does it mean by "q is a transmitter integer"?

Claim 20, line 4 and line 7, recites "the channel estimate", respectively, however, the specification page 4, lines 12-21, recites "the frequency domain channel response". Line 7, "second" should be inserted before "transform"; line 8, "time domain" should be inserted before "channel".

Claim 21, line 8, and claim 35, line 10, "second" should be deleted, respectively.

Claim 34, last line, the claim language suggests that each block includes more than one "training sequence signals" however the specification teaches it only includes one such sequence.

Note that any claim whose base claim is objected is likewise objected.

Appropriate correction is required.

Double Patenting

5. Claim 8 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 1. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-20, 34, and 37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, line 4, "said MIMO channel" lacks of proper antecedent basis. The same comment applies to claim 8, line 4 and claim 15, line 4.

Claim 10, last line, "the cyclic prefix" lacks of antecedent basis.

Claims 12 and 37, the limitation "the receiver" lacks of proper antecedent basis, respectively.

Claim 13, recites "combining estimates". However, it is unclear as to what "estimates" are being combined. It is "the channel characteristics" or "the phase difference"? the same comment applies to claim 15.

Claim 15, line 11, "said channel characteristic" lack of antecedent basis.

Claim 20, line 2, "the channel estimate" lacks of proper antecedent basis.

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Claim 34, line 12, "the oscillators" lacks of proper antecedent basis.

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 21, 22 and 36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 21, recites in lines 11-13, "the MIMO channel response estimate generated by combining an estimate of a channel characteristic for each subsequence and an estimate of a phase differences between each received subsequence". However, the specification as filed does not provide support for such limitations as claimed. The same comment applies to claim 36 and to claim 22.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

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only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1 and 3-8 rejected under 35 U.S.C. 102(e) as being anticipated by Lindoff et al US Patent No. 6,700,882.

As per claim 1, Lindoff et al discloses a method and apparatus, fig. 2A comprising estimation, transmitting training sequence signals **TSB and TSA** from a plurality of transmitting antennas **210 and 220**, through said MIMO channel see **fig. 2A**, such that training sequence signal transmissions from at least two of said plurality of transmitting antennas overlap in time see **fig. 2A**; said training sequence signals **TSB and TSA** being sent in block said block number as many as a number of said transmitting antennas **210 and 230** and during one block, the sequence include a same phase and the during another block, the sequence includes a different phase see col. 6, lines 24-34; receiving said training sequence signals at a plurality of receiving antennas **230 and 730**, through said MIMO channel; and comparing **inherently** said transmitted training sequence signals with said received training sequence signals to generate an estimate of a characteristic of said MIMO channel. Note that the training sequence is known sequence. i.e., once the sequence is received via the channel, the characteristic of the channel can be determined bay comparing the original sequence with the received sequence.

As per claim 3, signals sequence are simultaneously transmitted in time see col. 6, line 27.

As per claim 4, the training sequence has inherently equal power spectral density in frequency and time since the two training signals are equivalent.

As per claim 5, the signals inherently include chirp signals.

As per claim 6, the signals inherently include a prefix.

As per claim 7, see claim 1.

As per claim 8, see claim 1.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 2, 9, 11, 12 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable in view of Lindoff et al US Patent No.6,700,882.

As per claim 2, as applied to claim 1 above, Lindoff et al discloses every feature of the claimed invention but does not explicitly teach that the estimating step estimates a set of coefficients for each receive antenna and at least one coefficient corresponds to each transmitting antenna. It would have been obvious to one skill in the art to a set of coefficients for each receive antenna and at least one coefficient corresponds to each transmitting antenna in order to enhance system performance.

As per claim 9, it would have been obvious to one skill in the art to generate the estimate partly by a transform base procedure the reason would have been the same as provided above in reference to claim 2.

As per claim 11, it would have been obvious to one skill in the art to include a plurality of sequences in the training sequence so as to ensure that better estimate signals are generated.

As per claim 12, As per claim 37, it would have been obvious to one skill in the art to include an optimal sequence in said subsequence so as to provide a reference sequence to determine fine signal estimate.

As per claim 35 see claim 2.

14. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable in view of Raleigh et al in view of Lindoff et al US Patent No.6,700,882.

Regarding claim 34, Raleigh et al. disclose a communications system which teach almost all the claimed subject matter as follows. Raleigh et al. teach: a plurality of transmitters" (Raleigh et al. illustrates a plurality of transmitters in figure 6 elements 152a and 152b.); a plurality of receivers" (Raleigh et al. illustrates a plurality of receivers in figure 6 elements 170a and 170b.); a plurality of transmit and receive antennas" (Raleigh et al. illustrates a plurality of transmit and receive antennas in figure 6 elements 55.), a digital signal processing. . .for channel estimate" (Raleigh et al. illustrates the digital signal processing for channel estimation in figure 1 elements 10 and 20.); by using the redundancy in the received training signals" (The training signals are injected periodically in time, frequency, or time and frequency, note col. 6 lines 6-20). by transform-based techniques in both frequency and spatial domains" (Raleigh et al. illustrates the claimed subject matter in figure 3 element 140.);

However, Raleigh does not explicitly teach that the training sequence signals being sent in blocks and the blocks number as many or more than a number of said plurality of transmitting antennas and it further fails to teach that each block training signal has a different phase and that the phase and frequency offsets are compensated in the local oscillators of the transmitter and receiver. Lindoff teaches that the training sequence signals being sent in blocks and the blocks number as many or more than a number of said plurality of transmitting antennas see fig. 2A. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Raleigh so as to satisfy system design requirements. Furthermore, it would have been obvious to one skill in the art to include in each block training signal of a different phase so as to avoid cancellation of desired signal sequence at the receiver. In addition note that phase and frequency offsets has to be inherently are compensated in the local oscillators of the transmitter and receiver in order for the receiver to recover the signal transmitted by the transmitter.

Allowable Subject Matter

15. Claims 10, 13 and 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

16. Claims 15-20 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.


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17. The indicated allowability of claims 8 and 9 is withdrawn in view of the newly discovered reference(s) to Lindoff et al. Rejections based on the newly cited reference(s) are set forth above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean B. Corrielus whose telephone number is 571-272-3020. The examiner can normally be reached on Maxi-Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jean B. Corrielus
Primary Examiner
Art Unit 2637 9/16/05